MAPS+TPC simulation study for FF measurements

Dennis V. Perepelitsa
University of Colorado Boulder

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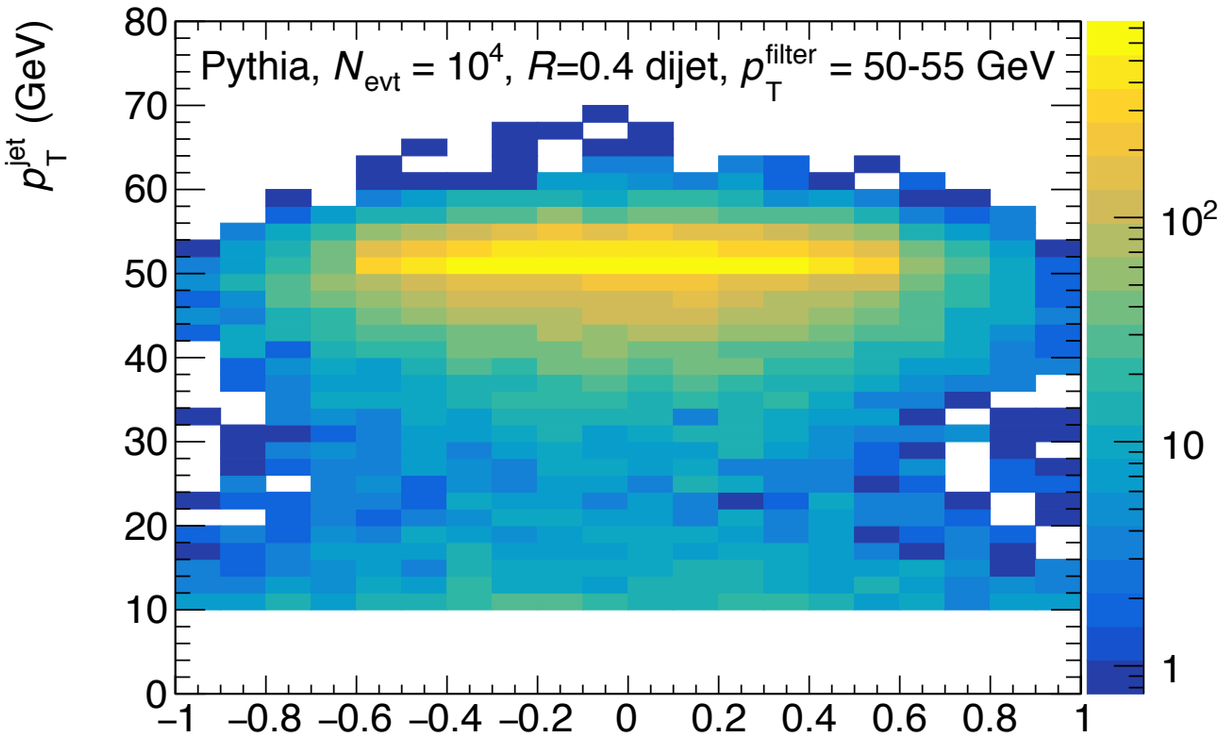
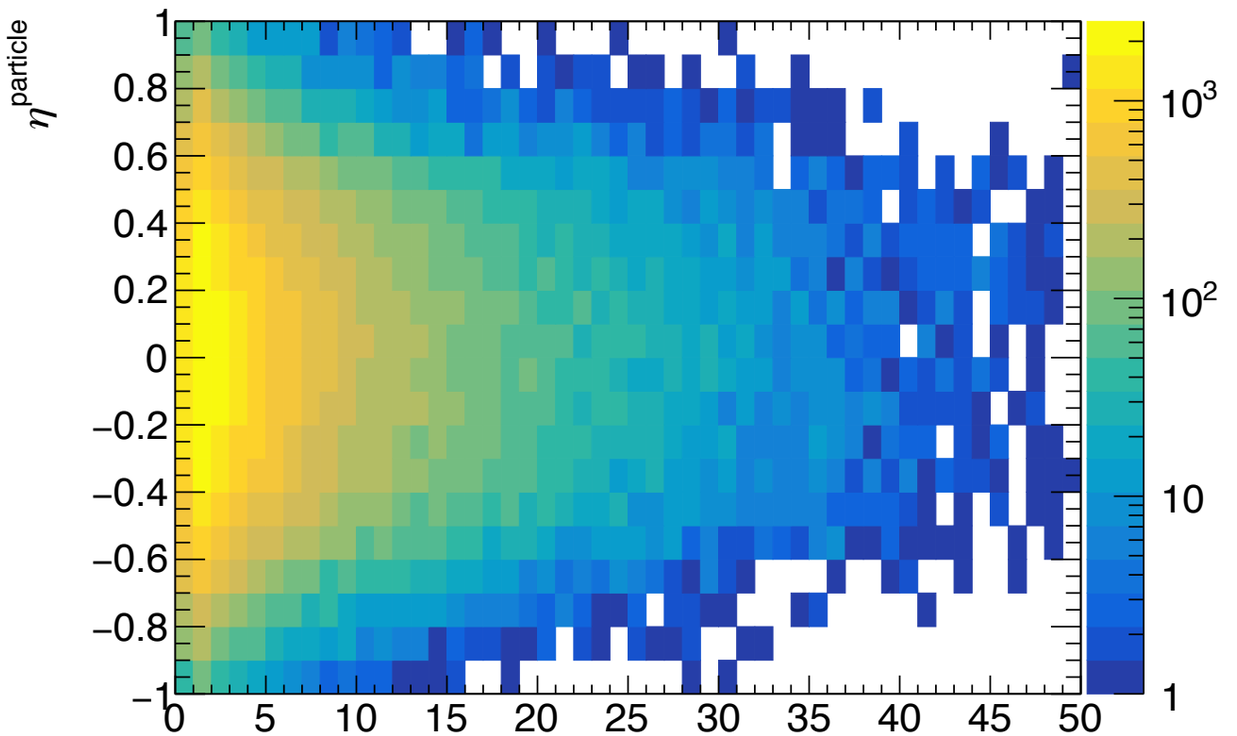
Overview

- Goal in this update: check my simulation & analysis chain for dijet event samples with the latest tracking simulation/software
  - ➡ tracking performance for a “specific use case”, to complement more “general” tracking performance plots
- Simulated 10k Pythia 50-55 GeV dijet events
  - ➡ /phenix/upgrades/decadal/dvp/GeneratorInputFiles/ hepmc_pTHatMin45QCDall_truthtrig50t55eta0p6_*
  - ➡ G4 simulation of tracker + beam pipe + magnet (no BBC, EMCal, I/OHCal)
  - ➡ will ultimately use Hijing embedding, but checking *pp* first
- Using “default” G4_Svtx_maps+tpc.C macro in main branch
  - ➡ can incorporate latest parameters / fixes and rerun
  - ➡ is a stable MAPS+Intermediate+TPC macro available for use?
- No pileup simulation (needed for this study on tracking review timescale?)

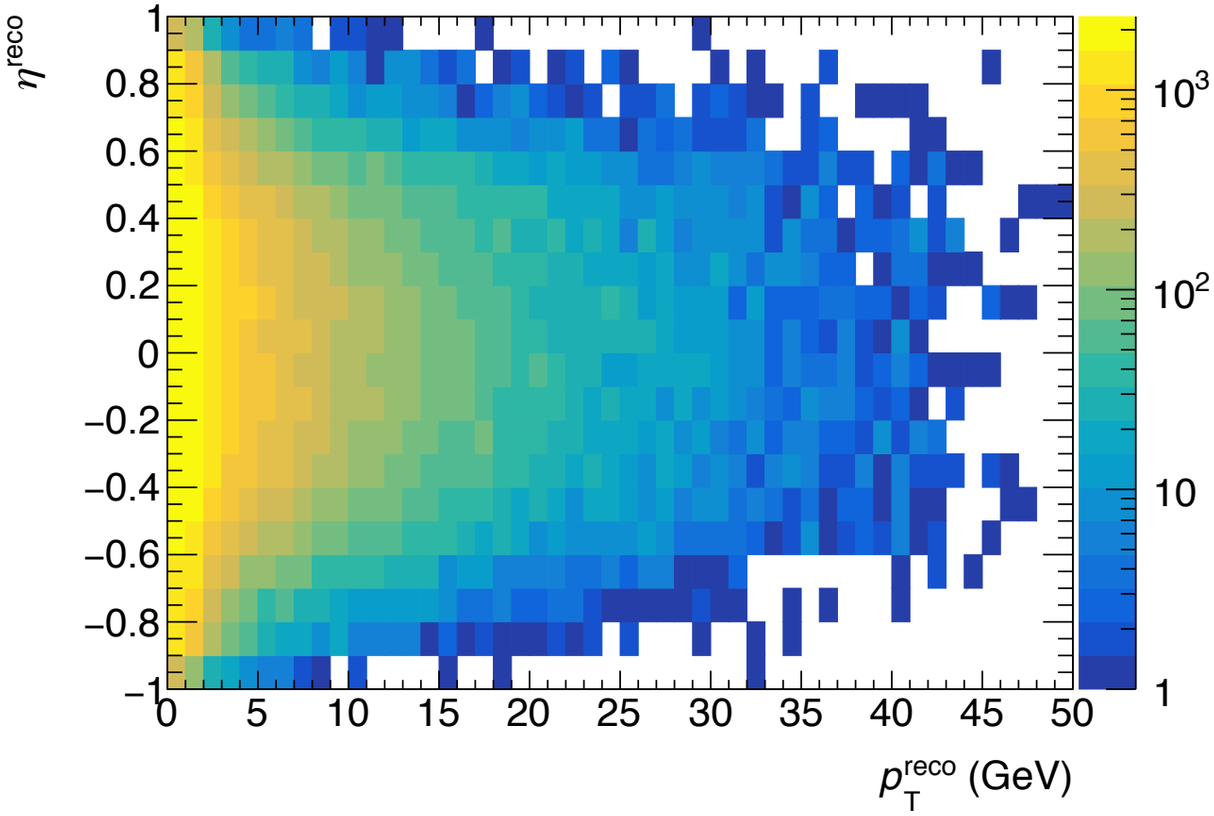
Truth quantities

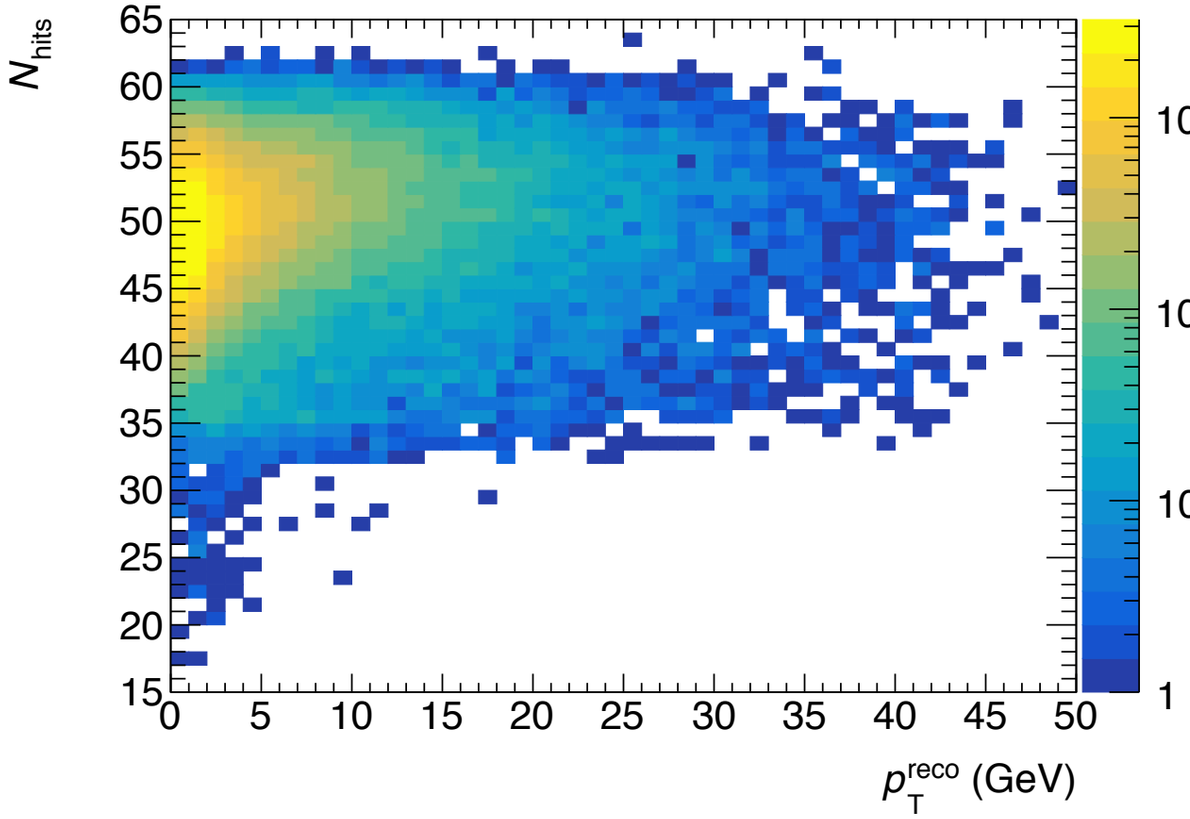




- *Left*: inclusive R=0.4 truth jet p_T/η distribution
  - ➡ p_T = 50-55 GeV, $|\eta|$<0.6 is the unbiased piece of the inclusive jet spectrum
  - ➡ everything else is additional jets in the event
- *Right*: p_T/η of truth charged particles (incl. $e^{\pm}$) within ΔR<0.4 of any truth jets
  - ➡ original 2012 sPHENIX proposal estimated 10k jets with >50 GeV in 0-20% Au+Au events
  - ➡ thus, expected reach is likely even higher than this MC sample

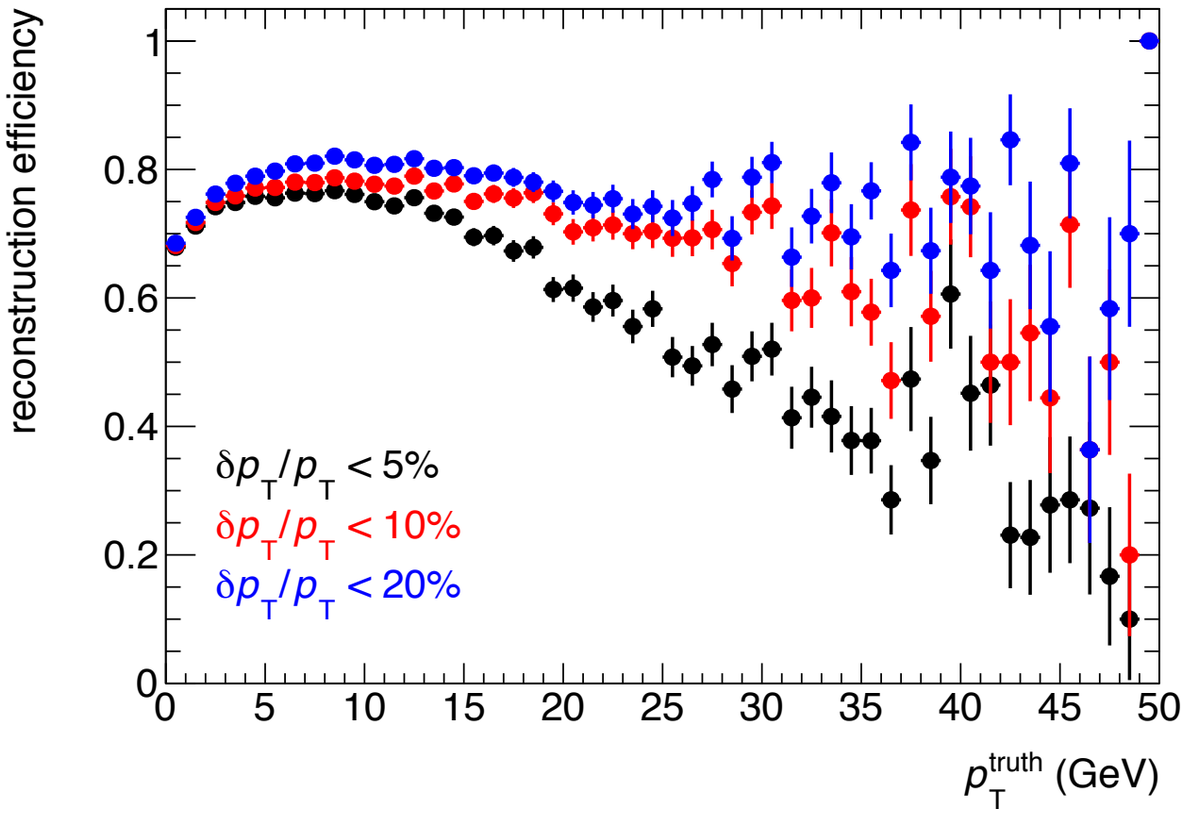
Reconstructed tracks

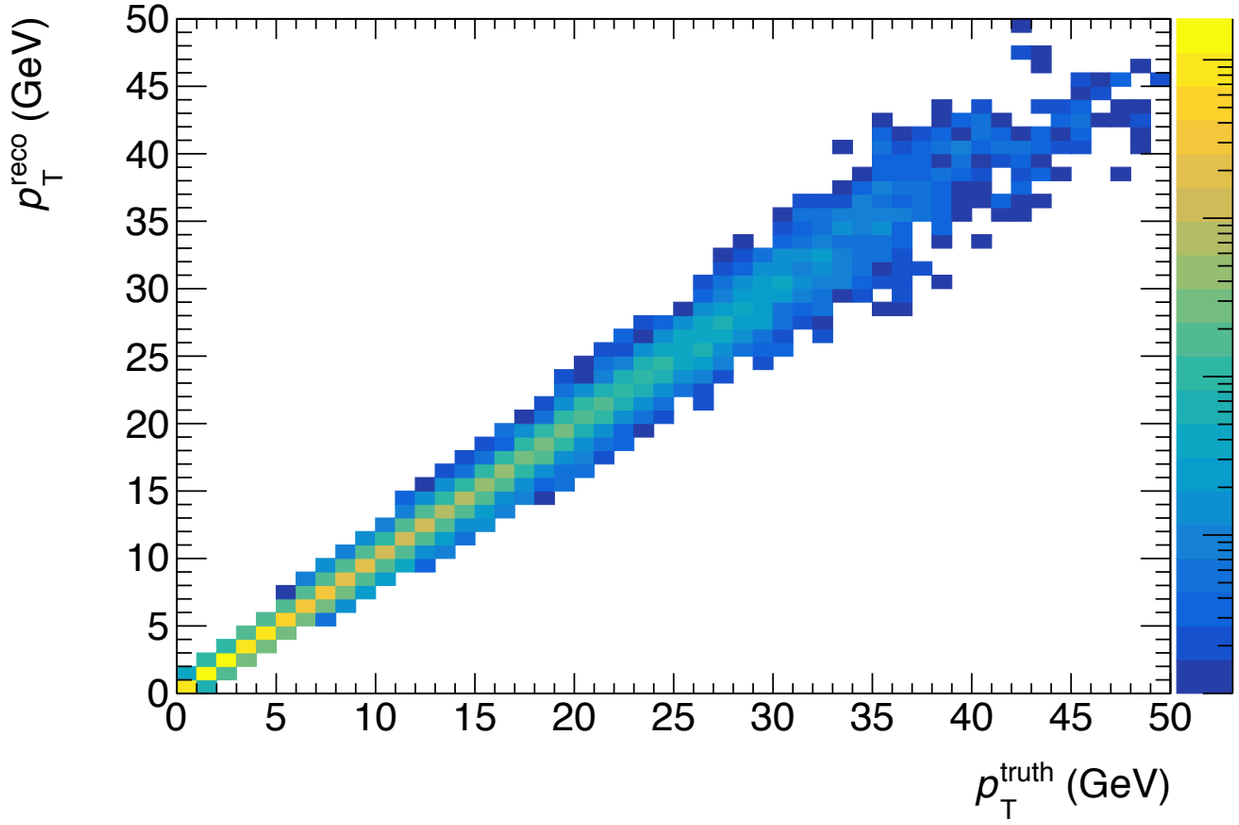




- *Left*: p_T/η for all reconstructed tracks in the events
- *Right*: p_T vs. number of "hits" (presumably MAPS + TPC together)
  - ➡ in previous studies with silicon detectors, would define truth-matching / fakes based on the contribution to $N_{cluster}$ from different truth particles
    - ➡ advice from tracking experts what to do here?

Reconstruction efficiency





- For each particle in jet cone, associate it with the nearest track within $\Delta R<0.1$
  - ➡ didn't get to a "proper" truth-tracing by contribution to N_{hits} for this meeting
- *Left*: fraction of truth particles that have a matching reco particle with $\delta p_T/p_T^{truth}$ < **5%**, **10%**, **20%**
  - ➡ efficiency saturates at 70-75% at high-p_T?
  - ➡ would this improve with latest version of macro?
- *Right*: p_T^{truth}-p_T^{reco} scatterplot for $\delta p_T/p_T^{truth}$ < 20% matches